DIN EN ISO 20344:2022-04 (E)

Personal protective equipment - Test methods for footwear (ISO 20344:2021)

Contents

Page

European foreword ... **7**

Foreword ... **8**

1 Scope ... **10**

2 Normative references ... **10**

3 Terms and definitions ... **11**

4 General testing parameters ... **11**
4.1 Sampling ... 11
4.2 Conditioning before and during the test ... 12
4.3 Prerequisites on the testing procedure ... 12
4.4 Test report ... 12

5 Test methods for whole footwear ... **15**
5.1 Specific ergonomic features ... 15
5.1.1 Sampling and conditioning ... 15
5.1.2 Test method ... 16
5.1.3 Test report ... 16
5.2 Determination of upper/outsole and sole interlayer bond strength ... 17
5.2.1 Principle ... 17
5.2.2 Test equipment ... 17
5.2.3 Sampling and conditioning ... 17
5.2.4 Test method ... 17
5.2.5 Test report ... 21
5.3 Determination of dimensions of toecap ... 21
5.3.1 Sampling and conditioning ... 21
5.3.2 Test method ... 21
5.3.3 Test report ... 21
5.4 Determination of impact resistance ... 21
5.4.1 Test equipment ... 21
5.4.2 Sampling and conditioning ... 25
5.4.3 Test methods ... 25
5.4.4 Test report ... 27
5.5 Determination of compression resistance ... 27
5.5.1 Test equipment ... 27
5.5.2 Sampling and conditioning ... 27
5.5.3 Test method ... 27
5.5.4 Test report ... 28
5.6 Behaviour of toecaps (thermal and chemical) ... 29
5.6.1 Sampling and conditioning ... 29
5.6.2 Behaviour of toecaps (thermal and chemical) ... 29
5.7 Determination of leak proofness ... 30
5.7.1 Test equipment ... 30
5.7.2 Sampling and conditioning ... 30
5.7.3 Test method ... 30
5.7.4 Test report ... 30
5.8 Dimensions of perforation resistant inserts ... 30
5.8.1 Sampling and conditioning ... 30
5.8.2 Test method ... 31
5.8.3 Test report ... 31

5.9 Determination of the perforation resistance of footwear with a metallic perforation resistant insert 32
5.9.1 Test equipment 32
5.9.2 Sampling and conditioning 32
5.9.3 Test method 33
5.9.4 Test report 33
5.10 Determination of the perforation resistance of footwear with a non-metallic perforation resistant insert 33
5.10.1 General 33
5.10.2 Test equipment 33
5.10.3 Sampling and conditioning 33
5.10.4 Test method 34
5.10.5 Test report 36
5.11 Behaviour of perforation resistant inserts (thermal and chemical) 37
5.11.1 Sampling and conditioning 37
5.11.2 Behaviour of perforation resistant inserts (thermal and chemical) 38
5.11.3 Test report 38
5.12 Determination of the flex resistance of perforation-resistant inserts 38
5.12.1 Sampling and conditioning 38
5.12.2 Test method 38
5.12.3 Test report 38
5.13 Determination of electrical resistance 39
5.13.1 Principle 39
5.13.2 Test equipment 39
5.13.3 Sampling and conditioning 39
5.13.4 Test method 40
5.13.5 Test report 40
5.14 Determination of footwear slip resistance 40
5.14.1 Sampling and conditioning 40
5.14.2 Test method 40
5.14.3 Test report 41
5.15 Determination of insulation against heat 41
5.15.1 Test equipment 41
5.15.2 Sampling and conditioning 42
5.15.3 Test method 42
5.15.4 Test report 42
5.16 Determination of insulation against cold 43
5.16.1 Test equipment 43
5.16.2 Sampling and conditioning 43
5.16.3 Test method 44
5.16.4 Test report 45
5.17 Determination of energy absorption of the seat region 45
5.17.1 Test equipment 45
5.17.2 Sampling and conditioning 47
5.17.3 Test method 47
5.17.4 Test report 47
5.18 Determination of resistance to water for whole footwear: trough test 47
5.18.1 Principle 47
5.18.2 Test equipment 47
5.18.3 Sampling and conditioning 48
5.18.4 Test method 48
5.18.5 Test report 49
5.19 Determination of resistance to water for whole footwear: dynamic test 49
5.19.1 Principle 49
5.19.2 Test equipment 49
5.19.3 Sampling and conditioning 49
5.19.4 Test method 49
5.19.5 Test report 51
5.20 Determination of impact resistance of a metatarsal protection 51
5.20.1 Test equipment 51
5.20.2 Sampling and conditioning 54
5.20.3 Test method 55
5.20.4 Test report 56
5.21 Determination of the dimension of the ankle protection 56

5.21.1 Sampling and conditioning ... 56
5.21.2 Test method ... 56
5.21.3 Test report ... 57
5.22 Determination of the shock absorption capacity of ankle protection materials incorporated into the upper ... 57
5.22.1 Principle ... 57
5.22.2 Test equipment ... 58
5.22.3 Sampling and conditioning ... 59
5.22.4 Test method ... 59
5.22.5 Test report ... 59
5.23 Determination of cutting resistance ... 60
5.23.1 Sampling and conditioning ... 60
5.23.2 Dimension of the cut resistant protective area ... 60
5.23.3 Test method ... 61
5.23.4 Test report ... 61
5.24 Scuff caps ... 61
5.24.1 Sampling and conditioning ... 61
5.24.2 Test method for the abrasion resistance of the scuff caps ... 61
5.24.3 Test report ... 61
5.25 Determination of seam strength ... 62
5.25.1 Sampling and conditioning ... 62
5.25.2 Test method ... 62
5.25.3 Test report ... 62

6 Test methods for upper, lining and tongue ... 62
6.1 Determination of thickness of upper ... 62
6.1.1 Sampling and conditioning ... 62
6.1.2 Test method ... 62
6.1.3 Test report ... 62
6.2 Measurement of the height of the upper ... 62
6.2.1 Sampling and conditioning ... 62
6.2.2 Test method for the complete upper ... 63
6.2.3 Test method for the determination of the area for non-water vapour permeable materials ... 63
6.3 Determination of tear strength of the upper, lining and/or tongue ... 65
6.3.1 Sampling and conditioning ... 65
6.3.2 Test method ... 65
6.3.3 Test report ... 66
6.4 Determination of the tensile properties of the upper material ... 66
6.4.1 Sampling and conditioning ... 66
6.4.2 Test method ... 66
6.4.3 Test report ... 67
6.5 Determination of upper flexing resistance ... 67
6.5.1 Sampling and conditioning ... 67
6.5.2 Test method ... 67
6.5.3 Test report ... 70
6.6 Determination of water vapour permeability (WVP) ... 70
6.6.1 Principle ... 70
6.6.2 Sampling and conditioning ... 70
6.6.3 Pre-treatment test method ... 70
6.6.4 WVP measurement ... 70
6.6.5 Test report ... 70
6.7 Determination of water vapour absorption (WVA) ... 71
6.7.1 Principle ... 71
6.7.2 Test equipment ... 71
6.7.3 Sampling and conditioning ... 71
6.7.4 Test method ... 71
6.7.5 Test report ... 73
6.8 Determination of water vapour coefficient (WVC) ... 73

6.8.1 Calculation of WVC ... 73
6.8.2 Test report ... 73
6.9 Determination of pH value ... 73
6.9.1 Sampling and conditioning ... 73
6.9.2 Test method ... 74
6.9.3 Test report ... 74
6.10 Determination of resistance to hydrolysis of upper ... 74
6.10.1 Sampling and conditioning ... 74
6.10.2 Test method ... 74
6.10.3 Test report ... 74
6.11 Determination of chromium VI content ... 74
6.11.1 Sampling and conditioning ... 74
6.11.2 Test method ... 74
6.11.3 Test report ... 75
6.12 Determination of abrasion resistance of lining and insock ... 75
6.12.1 Principle ... 75
6.12.2 Test equipment ... 75
6.12.3 Sampling and conditioning ... 76
6.12.4 Test method ... 76
6.12.5 Test report ... 77
6.13 Determination of water penetration and water absorption for upper ... 78
6.13.1 Principle ... 78
6.13.2 Test equipment ... 78
6.13.3 Sampling and conditioning ... 78
6.13.4 Test method ... 78
6.13.5 Test report ... 79

7 Test methods for insole, insock and footbed ... 80
7.1 Determination of insole, insock and footbed thickness ... 80
7.1.1 Sampling and conditioning ... 80
7.1.2 Test method ... 80
7.1.3 Test report ... 80
7.2 Determination of water absorption and desorption of insole and/or insock ... 80
7.2.1 Principle ... 80
7.2.2 Test equipment ... 80
7.2.3 Sampling and conditioning ... 81
7.2.4 Test method ... 81
7.2.5 Test report ... 82
7.3 Determination of abrasion resistance of insole ... 82
7.3.1 Principle ... 82
7.3.2 Test equipment ... 82
7.3.3 Sampling and conditioning ... 83
7.3.4 Test method ... 83
7.3.5 Test report ... 84

8 Test methods for outsole ... 84
8.1 General remarks ... 84
8.2 Determination of outsole dimensions ... 84
8.2.1 Sampling and conditioning ... 84
8.2.2 Determination of the cleated area ... 84
8.2.3 Outsole thickness and cleat height ... 85
8.2.4 Determination of cleat design in the waist area ... 87
8.3 Determination of tear strength of outsole ... 88
8.3.1 Sampling and conditioning ... 88
8.3.2 Test method ... 88
8.3.3 Test report ... 88
8.4 Determination of outsole abrasion resistance ... 88
8.4.1 Sampling and conditioning ... 88
8.4.2 Test method ... 88

8.4.3 Test report ... 88
8.5 Determination of footwear rigidity ... 88
8.5.1 Principle ... 88
8.5.2 Test equipment ... 89
8.5.3 Sampling and conditioning ... 89
8.5.4 Test method ... 89
8.5.5 Test report ... 91
8.6 Determination of flexing resistance of outsole ... 91
8.6.1 Principle ... 91
8.6.2 Test equipment ... 91
8.6.3 Sampling and conditioning ... 91
8.6.4 Test method ... 91
8.6.5 Test report ... 93
8.7 Determination of resistance to hydrolysis of outsole ... 93
8.7.1 Sampling and conditioning ... 93
8.7.2 Test method ... 93
8.7.3 Test report ... 93
8.8 Determination of resistance to fuel oil ... 93
8.8.1 Sampling and conditioning ... 93
8.8.2 Test methods ... 94
8.8.3 Test report ... 94
8.9 Determination of resistance to hot contact ... 95
8.9.1 Test equipment ... 95
8.9.2 Sampling and conditioning ... 97
8.9.3 Test methods ... 97
8.9.4 Test report ... 98

Annex A (informative) **Assessment of footwear by the laboratory during testing of thermal behaviour** ... **99**

Annex B (informative) **Footwear sizes** ... **102**

Bibliography ... **103**